

thermoplastic film such as polyethylene or EVA to create a more durable, waterproof, cut and wear resistant laminate.

SUMMARY OF THE INVENTION

5 The present invention relates to the heat lamination of a thermoplastic films to fabrics constructed of arrangements of fabrics constructed of high performance fibers such as high tenacity, high modulus, ultrahigh molecular weight polyethylene fibers. Various applications and potential applications of fabrics constructed of high strength polyethylene fibers require a flexible, light weight coating to prevent the penetration of
10 the fabric by fluids, chemicals and particles. These applications require the high strength-to-weight of the high performance, polyethylene fiber fabrics and consequently require a coating that is equally lightweight. In addition the coating must stretch with the fabric and is required to be tough, abrasion resistant, chemically resistant, well adhered and durable. Previously, high strength polyethylene fibers have not been coated or laminated
15 with conventional coatings or films due to their extremely low functionality and highly crystalline structure. There are no bonding sites to chemically bond adhesives or coatings.

 The method of the present invention includes making a cut and puncture resistant laminated fabric comprising laminating a layer of thermoplastic film to a layer
20 of fabric comprised of a high performance yarn. The laminating step is conducted at a temperature between about 230°F and about 290°F with a contact time of between about 5 minutes and about 4 to 8 hours with the application of a laminating pressure of between about 50 psi and about 500 psi. The thermoplastic film may be comprised of a material selected from the group consisting of high density polyethylene, low density polyethylene
25 and ethylene vinyl acetate. The high performance fiber is comprised of a material selected from the group consisting of extended chain polyethylene, ultra high molecular weight polyethylene, and aramid.

 Thus one aspect of the present invention is to provide an economical method for laminating a high performance fabric.

Another aspect of the present invention is to provide a method for making a lightweight sheet material having superior wear characteristics.

These and other aspects of the present invention will become apparent to those skilled in the art after a reading of the following description of the preferred embodiments
5 when considered in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWING(S)

FIGURE 1 is a schematic representation of a hydraulic press used for the
10 lamination process of the present invention.

FIGURE 2 is a schematic representation of a three step process for making a laminated fabric according to the present invention.

FIGURE 3 is a schematic representation of an alternative lamination process wherein the laminate and fabric are wound tightly around a core.
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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As used herein, the term "fabric" includes plain weave fabrics constructed using convention weaving techniques as well as knit fabrics again constructed using common knitting techniques. This term also includes felts of either single or multiple layers.

20 The term "fiber" as used herein refers to a fundamental component used in the assembly of yarns and fabrics. Generally a fiber is a component which has a length dimension which is much greater than its diameter or width. This term includes monofilament, multi-filament, ribbon, strip, staple, and other forms of chopped, cut or discontinuous fiber and the like having a regular or irregular crosssection. "Fiber" also
25 includes a plurality of any one of the above or a combination of the above.

The cross-sectional shapes of fibers suitable for the practice of the present invention include circular, flat or oblong. They may also be of irregular or regular multi-lobal cross-section having one or more regular or irregular lobes projecting from the linear or longitudinal axis of the filament.